ABSTRACT

This Final Project discusses the performance (average capacity in bps / Hz) 4x4 MIMO system using circular arrays operating in macrocell uplink direction. Performance evaluation considering the effects of array radius and angle spread of the distribution of angle-of-arrival of the signal components arriving at the array at the base station and mobile station.

Base station using a circular array of four elements, while the mobile station using a circular array of four elements with a radius of 0.5 λ. Distribution of angle of arrival signal components arriving at the array at the base station is modeled with a Laplacian distribution, while the distribution of angles of arrival of the signal components arriving at the array at the mobile station is modeled with a uniform distribution [0,360^o].

The simulation results show that the 4x4 MIMO system using a circular array has a good performance on a large spread angle conditions. Average capacity at 20 dB SNR for the array radius 0.5 λ, angle-of-arrival 0° and angle spread 3°, 10° and 50° respectively by 14 bps / Hz, 16 bps / Hz and 20 bps / Hz. In addition, this system also has a good performance on the condition that the radius of the array. Average capacity at 20 dB SNR for 10° angle spread, angle-of-arrival 0° and array radius 0.5 λ, 2λ and 5λ respectively of 20.7 bps / Hz, 24.7 bps / Hz and 1.26 bps / Hz. In addition, the radius of the minimum array (correlation $<$ 0.5) at the base station is 2.75 λ for the worst case that 3° angle spread and angle-of-arrival 0°.

Keywords: MIMO, circular array, spatial correlation, channel capacity